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(58) Field of search
B8H
Selected US specifications from IPC sub-class E02F

(54) Quick-change fitting for load shifting implement

(57) A quick-change fitting for attaching a load shifting implement, for example a bucket or fork-lift forks, to a vehicle, for example an earth-moving vehicle or a tractor, comprises two pins (16,25) which engage hooks (20,21) on the implement, one pin (25) being slidable in slots (26) by a hydraulic ram between bucket-engaging and release positions. The hydraulic line (34) to the ram may be disengaged and the ram retained pressurized with the pin (25) engaging slots 21 by a gas filled pressure accumulator.

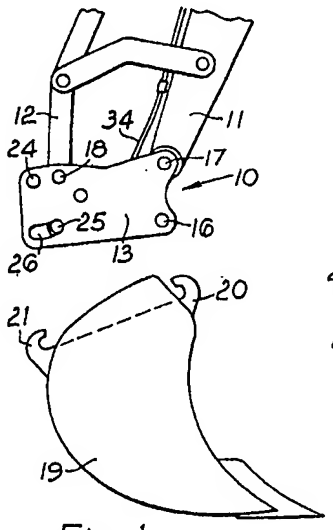

Fig. 1

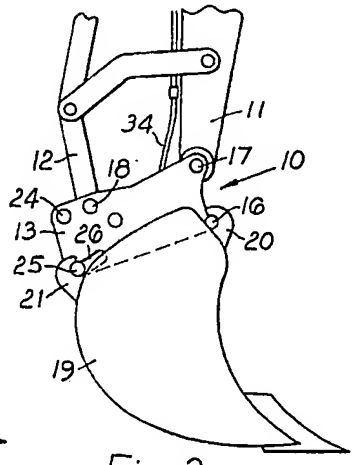

Fig. 2

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The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

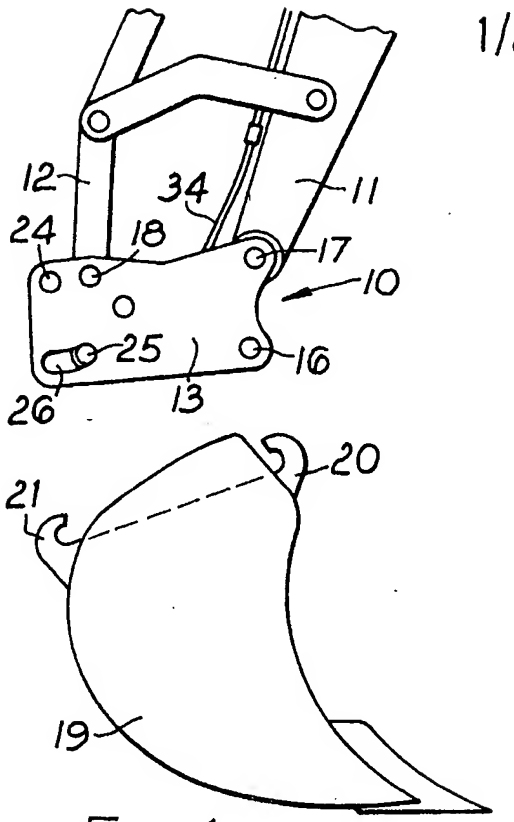

Fig. 1

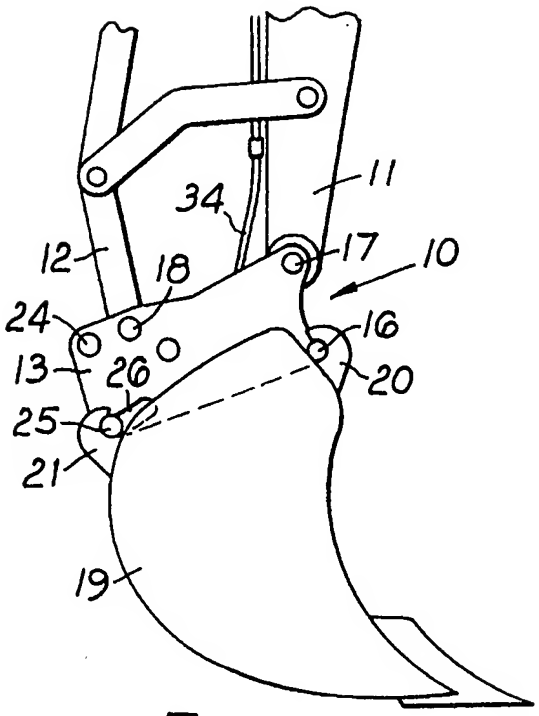

Fig. 2

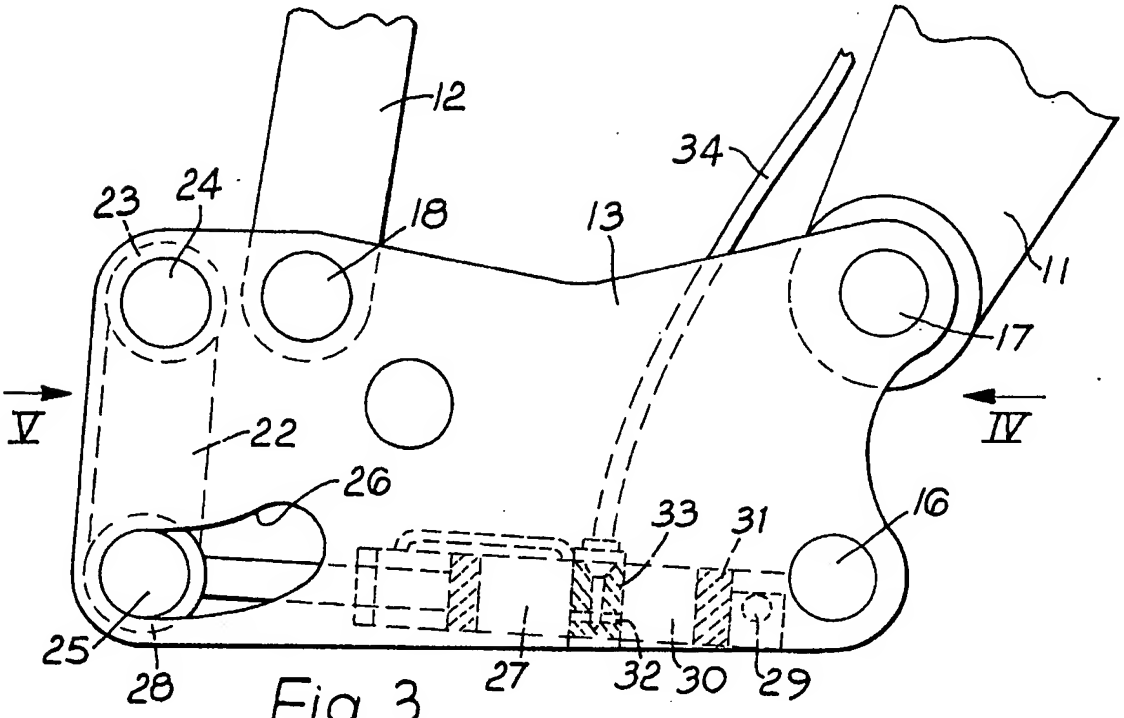

Fig. 3

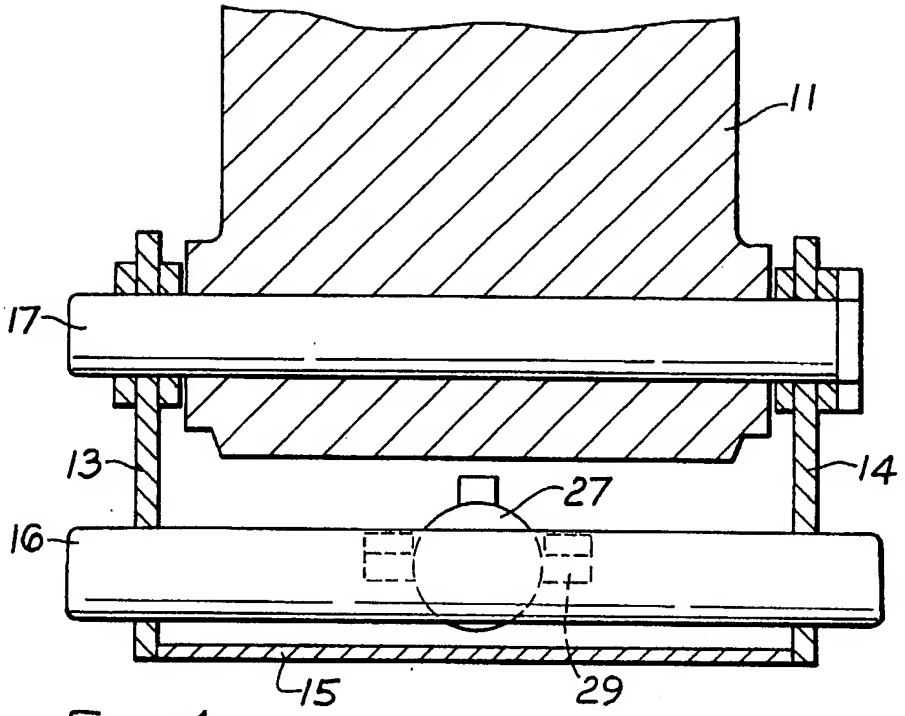

Fig. 4

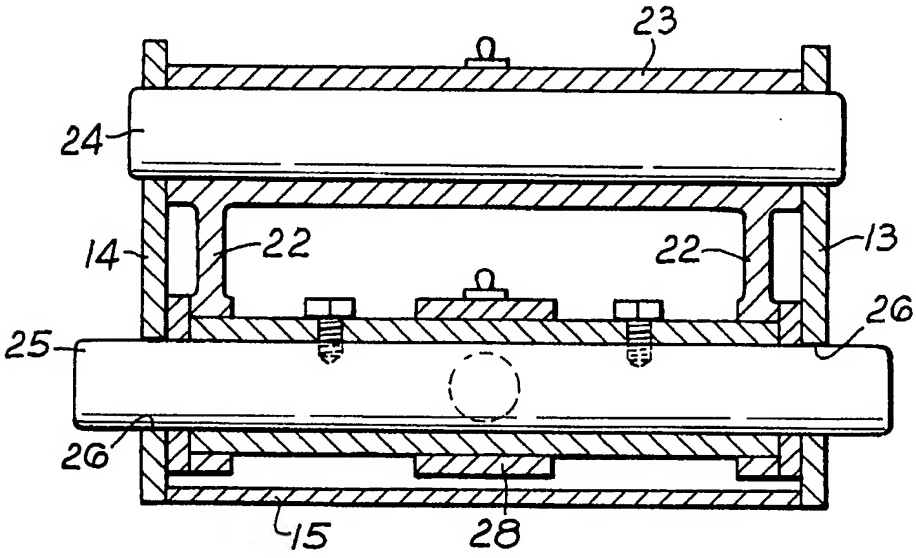

Fig. 5

SPECIFICATION

Quick-change fitting

The present invention is a quick-change fitting which enables the operator of an earth-moving or similar vehicle to interchange operating attachments such as excavator buckets and fork-lift forks without leaving the vehicle.

Within the earth-moving industry a wide variety of operating attachments have been developed to perform a wide range of tasks. However, in order to keep capital costs within bounds, the user demands interchangeable attachments suitable for fitting as desired on a single vehicle. Such interchangeable attachments allow the user to perform successive different earth-moving operations with one vehicle but the time spent by the vehicle operator in changing attachments is an important consideration in that it represents expensive operator and vehicle down-time.

With these considerations in mind, devices have more recently been developed which are intended to permit the vehicle operator to interchange attachments without leaving the cab of his vehicle. Such devices have met with varying degrees of success and suffer from certain disadvantages. In particular, the devices tend either to require such precise engagement as to render the interchange operation unduly complicated and time-consuming or to be such as to allow undue play at the fitting point when the selected attachment is used. In addition, it is believed that no quick-change fitting is available suitable for use with narrow back-hoe buckets.

It is therefore an object of the present invention to provide an improved quick-change fitting which is suitable for operation from the vehicle cab and which can be adapted for use with back-hoe buckets and can reduce or eliminate "play" in use.

The quick-change fitting according to the present invention comprises a first bucket-engaging means, a second bucket-engaging means and hydraulic means to urge the respective bucket-engaging means apart. Thus the quick-change fitting functions by urging the respective bucket-engaging means each into positive engagement with the bucket or other attachment and thereby makes it possible to eliminate play completely.

It will readily be understood that the fitting is equally suitable for connecting to the earth-moving vehicle, attachments other than excavator buckets, for example fork-lift attachments and bulldozer ploughs. Thus the expression "bucket- engaging means" is not intended to limit the fitting to use with buckets but rather to indicate that the fitting is suitable for that among other purposes.

Each bucket-engaging means may take the form of one or more pins, intended to engage, preferably laterally, an open hook or socket on the bucket or other attachment. Thus, as will be understood more readily by reference to the accompanying drawings, one or both bucket-engaging means may preferably take the form of two cylindrical pins, in particular the two ends of an elongated tubular and/or cylindrical member, which pins, by lateral movement of the elongated member, are able to enter open hooks on the bucket or other attachment.

In particularly preferred form of the invention, both of the bucket-engaging means are elongated cylindrical members mounted axially parallel to each other on a suitable support, and hydraulic means are provided to urge the cylindrical members apart in a direction transverse to their axes. It is not necessary that both of the cylindrical members be movable relative to the support; it is convenient that one member be fixed and one be movable.

The engaging of the bucket-engaging means with the bucket is, as indicated, effected hydraulically. Thus the respective bucket-engaging means may be urged apart by means of a hydraulic ram, operating either between the respective bucket-engaging means or between a fixed feature of the fitting and a movable one of the bucket-engaging means. Thus, for example, the hydraulic means may take the form of a double-acting ram, which may extend to effect engagement of the fitting with the bucket and retract to disengage the bucket when a change of operating attachment is desired. Alternatively, the hydraulic means may be a single-acting ram, operable to engage the bucket by extension, the subsequent release of the bucket being effected other than hydraulically. It will be understood that the positive engagement of the bucket is an important operation which requires hydraulic pressure for its effective achievement but that disengagement may be achieved more cheaply and equally satisfactorily by, for example, use of a return spring or gas return action to retract the hydraulic ram. For example, the arrangement may be such that nitrogen gas is pressured by the extending action of the ram; when the ram-extending hydraulic pressure is removed, expansion of the compressed gas disengages the fitting.

While the operating attachment is in use, it is of course necessary to maintain the bucket-engaging means in engagement. Preferably a hydraulic accumulator is provided, to maintain the pressure apart of the respective bucket-engaging means (and thereby maintain the positive locking of the attachment), while freeing the hydraulic service line for other purposes.

The invention will now be further described with reference to the accompanying drawings, in which:

Figure 1 illustrates a quick-change fitting according to the present invention, with a bucket ready for attachment;

Figure 2 illustrates the fitting and bucket of Figure 1, with the bucket fully engaged;

Figure 3 illustrates the fitting of Figures 1 and 2 in enlarged detail, in side elevation;

Figure 4 is a front-end sectional view corresponding to Figure 3, viewed in the direction of the arrow IV of Figure 3; and

Figure 5 is a rear-end sectional view corresponding to Figure 3, viewed in the direction of the arrow V of Figure 3.

Referring to the drawings, a quick-change fitting

indicated generally by the numeral 10 is carried by the dipper arm 11 and tipping link 12 of a conventional back-hoe loader. The fitting 10 comprises two parallel sideplates 13, 14, braced apart by a base-plate 15 and by a solid cylindrical cross-pin 16, as well as by the pivot pins 17 and 18 of the dipper arm 11 and tipping link 12 respectively.

An excavator bucket 19 (Figures 1 and 2) has two engagement hooks 20 and two engagement hooks 21 to enable the quick-change fitting to engage the bucket for connection to, and operation by, the back-hoe loader.

Suspended upon arms 22 from a sleeve 23 pivotting on a cylindrical pivot pin 24 is a cylindrical locking pin 25. The extent of swing of the locking pin 25 is defined by arcuate slots 26 in the sideplates 13, 14, into which slots the opposite ends of the pin 25 project. The movement of the locking pin 25 between the ends of the slots 26 is effected by means of a double-acting hydraulic ram 27, working between a sleeve 28 on the locking pin 25 and trunnion pins 29 depending from the cross-pin 16. Colinear with the cylinder of the hydraulic ram 27 is a cylindrical, nitrogen-filled, pressure accumulator 30, having a piston 31 of which the oil-pressure side is in communication with the ram 27 via a passage 32 in a pilot-operated check valve 33, by means of which the hydraulic service line 34 of the vehicle is connected to the ram 27.

As shown more particularly in Figures 1 and 2, when it is desired to pick up the bucket 19, the dipper arm 11 and tipping link 12 are operated so that, with the locking pin at its right-hand limit, the cross-pin 16 is located under the hooks 20. Hydraulic pressure via the service line 34 is applied to the right-hand side of the piston of the ram 27, thereby moving the locking pin 25 to the left and thus engaging the pin 25 under the hooks 21. The bucket 19 is now positively and firmly held upon the dipper arm 11 and can be operated in the manner of a conventional excavator bucket from the cab of the vehicle.

If desired, the service line 34 may be disconnected from the fitting 10 and used for another purpose (for example operating a grab or claw associated with the bucket), until the bucket 19 is to be exchanged for another attachment. While the line 34 is disconnected, the pressure in the fitting is maintained by means of the check valve 33 and the accumulator 30.

It is a particular advantage of the fitting illustrated in the drawings that, because of its manner of operation and the fact that the hooks 20 are identical with the hooks 21, the excavator bucket can be disengaged from the vehicle and then reconnected in the reverse position. Thus the bucket, having been used in back actor mode, may be reversed and used in a face shovel operation.

CLAIMS

1. A quick-change fitting for attaching on operating attachment such as a bucket to a vehicle, comprising a first bucket-engaging means, a second bucket-engaging means and hydraulic means to urge the respective bucket- engaging means apart.

2. A quick-change fitting as claimed in claim 1, wherein one or both of said bucket-engaging means comprises one or more pins.

3. A quick-change fitting as claimed in claim 2, wherein said pins are urged apart laterally relative to their axes.

4. A quick-change fitting as claimed in claim 3, wherein one or both of said bucket-engaging means comprises an elongated tubular and/or cylindrical member, the ends of which may engage a bucket by lateral movement of said tubular member.

5. A quick-change fitting as claimed in claim 4, wherein both of the bucket-engaging means are elongated cylindrical members, mounted axially parallel to each other on a support, and hydraulic means are provided to urge the cylindrical members apart in a direction transverse to their axes.

6. A quick-change fitting as claimed in any of the preceding claims, wherein one of the bucket-engaging means is fixed relative to said fitting and the other is movable relative thereto.

7. A quick-change fitting as claimed in any of the preceding claims, wherein the hydraulic means is a hydraulic ram, operating between the respective bucket-engaging means.

8. A quick-change fitting as claimed in any of claims 1 to 6, wherein the hydraulic means is a hydraulic ram, operating between a fixed feature of the fitting and a movable one of the bucket-engaging means.

9. A quick-change fitting as claimed in claim 7 or claim 8, wherein the hydraulic means is a double-acting ram.

10. A quick-change fitting as claimed in claim 7 or claim 8, wherein the hydraulic means is a single-acting ram and the return stroke of said ram is effected by a return spring or by compressed gas.

11. A quick-change fitting as claimed in any of the preceding claims, having a hydraulic accumulator to maintain the bucket-engaging means apart.

12. A quick-change fitting for attaching an operating attachment such as a bucket to a vehicle, said fitting being substantially as hereinbefore described with reference to, and as illustrated in, the accompanying drawings.

13. A quick-change fitting as claimed in any of the preceding claims, in combination with one or more operating attachments having at least two open hooks and/or sockets for engagement with said fitting.

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